

This listing of claims will replace all prior versions, and listings, of claims in the application.

Listing of Claims:

1 (previously presented). A polymersome comprising:

(i) a plurality of amphiphilic copolymers comprising amphiphilic block copolymers that comprise at least one hydrophilic polymer bonded to at least one hydrophobic polymer; and

(ii) at least one visible- or near infrared-emissive agent that is dispersed within the polymersome membrane, where said emissive agent emits light in the 700-1100 nm spectral regime and where said emissive agent is an emissive conjugated compound comprising at least two covalently bound moieties; whereby upon exposing said compound to an energy source for a time and under conditions effective to cause said compound to emit light that at a wavelength between 700-1100 nm, said compound exhibits an integral emission oscillator strength that is greater than the emission oscillator strength manifest by either one of the said moieties individually; wherein said emissive agent comprises at least two porphyrin moieties, said porphyrin moieties being linked by a hydrocarbon bridge comprising at least one unsaturated moiety.

2-9 (canceled).

10 (currently amended). The polymersome of claim 1 ~~2~~ where at least one of the emissive agent is an emissive conjugated compound comprising at least two covalently bound moieties; whereby upon exposing said compound to an energy source for a time and under conditions effective to cause said compound to emit light at a wavelength between 700-1100 nm, is of an intensity that is greater than a sum of light emitted by either of covalently bound moieties individually.

11 (canceled).

12 (previously presented). A polymersome as in claim 10 where the covalently bound moieties that define the emissive species are linked by at least one carbon-carbon double bond, carbon-carbon triple bond, or a combination thereof.

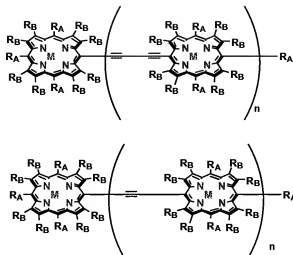
13 (previously presented). A polymersome as in claim 10 where the covalently bound moieties that define the emissive species are linked by ethynyl, ethenyl, allenyl, butadiynyl, polyvinyl, thiophenyl, furanyl, pyrrolyl, or p-diethylarenyl linkers or by a conjugated heterocycle that bears diethynyl, di(polyynynyl), divinyl, di(polyvinyl), or di(thiophenyl) substituents.

14 (withdrawn). A polymersome as in claim 10 where the covalently bound moieties that define the emissive species are linked by at least one imine, phenylene, thiophene, or amide, ether, thioether, ester, ketone, sulfone, or carbodiimide group.

15 (previously presented). The polymersome of claim 1 where said polymersome is bioresorbable

16 (previously presented). The polymersome of claim 1 wherein the said emissive agent is an ethynyl- or butadiynyl-bridged multi(porphyrin) compound that features a β -to- β , meso-to- β , or meso-to-meso linkage topology, and the porphinato imaging agent being capable of emitting in the 700-to-1100 nm spectral regime.

17 (previously presented). The polymersome of claim 16 wherein the emissive agent is of the formula:



where M is a metal or H₂, where H₂ denotes the free ligand form of the macrocycle;

R_A and R_B are each, independently, H, C₁-C₂₀ alkyl or C₁-C₂₀ heteroalkyl, C₆-C₂₀ aryl or heteroaryl, C(R_C)=C(R_D)(R_E), C≡C(R_D), or a chemical functional group comprising a peptide, nucleoside or saccharide where R_C, R_D and R_E are each independently, H, F, Cl, Br, I, C₁-C₂₀ alkyl or C₄-C₂₀ heteroalkyl, aryl or heteroaryl, C₂-C₂₀ alkenyl or heteroalkenyl, alkynyl or C₂-C₂₀ heteroalkynyl, trialkylsilyl, or porphyrinato;

and n is an integer from 1 to 10.

18 (original). The polymersome of claim 17 where n is an integer from 1 to 8.

19 (previously presented). The polymersome of claim 17 where M of the emissive agent is zinc, magnesium, platinum, palladium, or H₂, where H₂ denotes the free ligand form of the macrocycle.

20 (original). The polymersome of claim 17 where said polymersome porphyrin-based imaging agent is emissive.

21 (previously presented). The polymersome of 17, wherein the said emissive agent comprises a meso-to-meso ethyne- or butadiyne-bridged linkage topology, said imaging agent being capable of emitting in the 700-to-1100 nm spectral regime.

22 (previously presented). The polymersome of claim 1 wherein said polymersome comprises one amphiphilic block co-polymer.

23 (previously presented). The polymersome of claim 1 wherein said amphiphilic block co-polymer comprises one hydrophobic polymer and one hydrophilic polymer.

24 (withdrawn). The polymersome of claim 1 wherein said amphiphilic block co-polymer is a triblock polymer comprising terminal hydrophilic polymers and a hydrophobic internal polymer.

25 (withdrawn). The polymersome of claim 1 wherein said amphiphilic block co-polymer is a tetrablock polymer comprising two hydrophilic polymer blocks and two hydrophobic polymer blocks.

26 (withdrawn). The polymersome of claim 25 comprising terminal hydrophilic polymer blocks and internal hydrophobic polymer blocks.

27 (withdrawn). The polymersome of claim 1 wherein said amphiphilic block co-polymer is a pentablock polymer comprising two hydrophilic polymer blocks and three hydrophobic polymer blocks.

28 (withdrawn). The polymersome of claim 1 wherein said amphiphilic block co-polymer is a pentablock polymer comprising three hydrophilic polymer blocks and two hydrophobic polymer blocks.

29 (withdrawn). The polymersome of claim 1 wherein said amphiphilic block co-polymer is a pentablock polymer comprising four hydrophilic polymer blocks and one hydrophobic polymer block.

30 (withdrawn). The polymersome of claim 1 wherein said amphiphilic block co-polymer comprises at least six block, at least two of which are hydrophilic polymer blocks.

31 (withdrawn). The polymersome of claim 1 further comprising at least one lipid, phospholipid, steroid, cholesterol, single chain alcohol, peptide, or surfactant.

32 (withdrawn). The polymersome of claim 1 wherein the amphiphilic co-polymer is made by attaching two strands comprising different monomers.

33 (withdrawn). The polymersome of claim 1 wherein the amphiphilic co-polymer comprises polymers made by free radical initiation, anionic polymerization, peptide synthesis, or ribosomal synthesis using transfer RNA.

34 (previously presented). The polymersome of claim 1 wherein the hydrophilic polymer comprises poly(ethylene oxide) or poly(ethylene glycol).

35 (previously presented). The polymersome of claim 1 wherein the hydrophilic polymer is soluble in water.

36 (previously presented). The polymersome of claim 1 wherein the hydrophilic polymer comprises polymerized units selected from ionically polymerizable polar monomers.

37 (original). The polymersome of claim 36 wherein the ionically polymerizable polar monomers comprise an alkyl oxide monomer.

38 (original). The polymersome of claim 37 wherein the alkyl oxide monomer is ethylene oxide, propylene oxide, or any combination thereof.

39 (previously presented). The polymersome of claim 1 wherein the hydrophilic polymer comprises poly(ethylene oxide).

40 (previously presented). The polymersome of claim 1 wherein the volume fraction of the hydrophilic polymers in the plurality of amphiphilic block copolymers is less than or equal to 0.40.

41 (previously presented). The polymersome of claim 1 wherein the hydrophobic polymer comprises polyethylene, poly(butadiene), poly(β -benzyl-L-aspartate), poly(lactic acid), poly(propylene oxide), poly(ϵ -caprolactam), oligo-methacrylate, or polystyrene.

42 (previously presented). The polymersome of claim 1 wherein the hydrophobic polymer comprises polyethylene or poly(butadiene).

43 (withdrawn). The polymersome of claim 1 wherein the hydrophobic polymer comprises polymerized units selected from unsaturated monomers.

44 (withdrawn). The polymersome of claim 43 wherein the unsaturated monomers are hydrocarbons.

45 (withdrawn). The polymersome of claim 1 where said polymersome contains a hydrophobic polycaprolactone, polylactide, polyglycolide, or polymethylene carbonate polymer block used in combination with a corresponding polyethylenoxide polymer block.

46 (original). The polymersome of claim 1 wherein the amphiphilic block copolymer is poly(ethylene oxide)-polyethylene, poly(ethylene oxide)-poly(butadiene), poly(ethylene oxide)-poly(ϵ -caprolactone) or poly(ethylene oxide)-poly(lactic acid).

47 (withdrawn). The polymersome of claim 1 additionally comprising a therapeutic agent.

48 (withdrawn). The polymersome of claim 1 additionally comprising one or more distinct emissive species.

49 (withdrawn). The polymersome of claim 1 additionally comprising at least one of a secondary emitter, a cytotoxic agent, a magnetic resonance imaging (MRI) agent, positron emission tomography (PET) agent, radiological imaging agent or a photodynamic therapy (PDT) agent.

50 (withdrawn). The polymersome of claim 1 additionally comprising at least one of a secondary emitter, a cytotoxic agent, a magnetic resonance imaging (MRI) agent, positron emission tomography (PET) agent, photodynamic therapy (PDT) agent, radiological imaging agent, ferromagnetic agent, or ferrimagnetic agent, where said emitter or agent is compartmentalized within the aqueous polymersome interior.

51 (withdrawn). The polymersome of claim 1 additionally comprising a protein, peptide, saccharide, nucleoside, inorganic compound, biological entity such as a virus, organelle, bacterium, or cellular component, or organic compound compartmentalized within the aqueous polymersome interior.

52 (previously presented). A polymersome comprising:

(i) a membrane comprising a plurality of amphiphilic copolymers comprising amphiphilic block copolymers that comprise at least one hydrophilic polymer bonded to at least one hydrophobic polymer;

(ii) at least one emissive agent that emits light at a wavelength between 700-1100 nm where said emissive agent is an emissive conjugated compound comprising at least two covalently bound moieties; whereby upon exposing said compound to an energy source for a time and under conditions effective to cause said compound to emit light that at a wavelength between 700-1100 nm, said compound exhibits an integral emission oscillator strength that is greater than the emission oscillator strength manifest by either one of the said moieties individually; wherein said emissive agent comprises at least two porphyrin moieties, said

porphyrin moieties being linked by a hydrocarbon bridge comprising at least one unsaturated moiety; and

(iii) at least one targeting moiety associated with a surface of the polymersome.

53-54 (canceled).

55 (previously presented). The polymersome of claim 52 where at least one of the emissive agents has a porphyrin-based component.

56-59 (canceled)

60 (previously presented). The polymersome of claim 52 where at least one of the emissive agent is an emissive conjugated compound comprising at least two covalently bound moieties; whereby upon exposing said compound to an energy source for a time and under conditions effective to cause said compound to emit light at a wavelength between 700-1100 nm, is of an intensity that is greater than a sum of light emitted by either of covalently bound moieties individually.

61 (canceled).

62 (previously presented). A polymersome as in claim 60 where the covalently bound moieties that define the emissive species are linked by at least one carbon-carbon double bond, carbon-carbon triple bond, or a combination thereof.

63 (previously presented). A polymersome as in claim 60 where the covalently bound moieties that define the emissive species are linked by ethynyl, ethenyl, allenyl, butadiynyl, polyvinyl, thiophenyl, furanyl, pyrrolyl, p-diethylarenyl or any conjugated heterocycle that bears diethynyl, di(polyynynyl), divinyl, di(polyvinyl), or di(thiophenyl) substituents.

64 (withdrawn). A polymersome as in claim 60 where the covalently bound moieties that define the emissive species are linked by at least one imine, phenylene, thiophene, or amide, ether, thioether, ester, ketone, sulfone, or carbodiimide group.

65 (previously presented). The polymersome of claim 52 where said polymersome is bioresorbable.

66 (withdrawn). The polymersome of claim 65 where said polymersome contains a hydrophobic polycaprolactone, polylactide, polyglycolide, or polymethylene carbonate polymer block used in combination with a corresponding polyethyleneoxide polymer block.

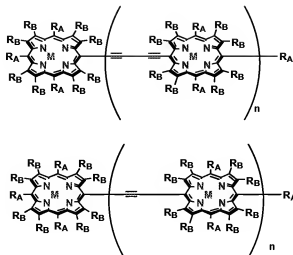
67 (withdrawn). The polymersome of claim 52 where said polymersome contains block polymer components approved by the United States Food and Drug Administration (FDA) for use *in vivo*.

68 (withdrawn). The polymersome of claim 52 wherein the targeting moiety specifically binds with a biological situs.

69 (withdrawn). The polymersome of claim 52 wherein the targeting moiety specifically binds with a biological situs under physiological conditions.

70 (previously presented). The polymersome of claims 55 wherein the said emissive agent is an ethynyl- or butadiynyl-bridged multi(porphyrin) compound that features a β -to- β , meso-to- β , or meso-to-meso linkage topology, and the porphinato imaging agent being capable of emitting in the 700-to-1100 nm spectral regime.

71 (previously presented). The polymersome of claim 70 wherein the emissive agent is of the formula:



where M is a metal or H₂, where H₂ denotes the free ligand form of the macrocycle;

R_A and R_B are each, independently, H, alkyl or C₁-C₂₀ heteroalkyl, C₆-C₂₀ aryl or heteroaryl, C(R_C)=C(R_D)(R_E), C≡C(R_D), or a chemical functional group comprising a peptide, nucleoside or saccharide where R_C, R_D and R_E are each independently, H, F, Cl, Br, I, C₁-C₂₀ alkyl or C₄-C₂₀ heteroalkyl, aryl or heteroaryl, C₂-C₂₀ alkenyl or heteroalkenyl, alkynyl or C₂-C₂₀ heteroalkynyl, trialkylsilyl, or porphyrinato;

and n is an integer from 1 to 10.

72 (original). The polymersome of claim 71 where n is an integer from 1 to 8.

73 (previously presented). The polymersome of claim 72 where M of the emissive agent is zinc, magnesium, platinum, palladium, or H₂, where H₂ denotes the free ligand form of the macrocycle.

74 (original). The polymersome of claim 55 where said polymersome porphyrin-based imaging agent is emissive.

75 (previously presented). The polymersome of 55, wherein the said emissive agent comprises a meso-to-meso ethyne- or butadiyne-bridged linkage topology, said imaging agent being capable of emitting in the 700-to-1100 spectral regime.

76 (withdrawn). The polymersome of claim 52 wherein the targeting moiety comprises an antibody, antibody fragment, or substance specific for a given receptor binding site.

77 (withdrawn). The polymersome of claim 56 wherein the receptor binding site, or targeting moiety comprises a receptor-specific peptide, carbohydrate, protein, lipid, nucleoside, peptide nucleic acid, organic compound, or combinations thereof.

78 (previously presented). The polymersome of claim 52 wherein said polymersome comprises one amphiphilic block co-polymer.

79 (previously presented). The polymersome of claim 52 wherein said amphiphilic block co-polymer comprises one hydrophobic polymer and one hydrophilic polymer.

80 (withdrawn). The polymersome of claim 52 wherein said amphiphilic block co-polymer is a triblock polymer comprising terminal hydrophilic polymers and a hydrophobic internal polymer.

81 (withdrawn). The polymersome of claim 52 wherein said amphiphilic block co-polymer is a tetrablock polymer comprising two hydrophilic polymer blocks and two hydrophobic polymer blocks.

82 (withdrawn). The polymersome of claim 81 comprising terminal hydrophilic polymer blocks and internal hydrophobic polymer blocks.

83 (withdrawn). The polymersome of claim 52 wherein said amphiphilic block co-polymer is a pentablock polymer comprising two hydrophilic polymer blocks and three hydrophobic polymer blocks.

84 (withdrawn). The polymersome of claim 52 wherein said amphiphilic block copolymer is a pentablock polymer comprising three hydrophilic polymer blocks and two hydrophobic polymer blocks.

85 (withdrawn). The polymersome of claim 52 wherein said amphiphilic block copolymer is a pentablock polymer comprising four hydrophilic polymer blocks and one hydrophobic polymer block.

86 (withdrawn). The polymersome of claim 52 wherein said amphiphilic block copolymer comprises at least six block, at least two of which are hydrophilic polymer blocks.

87 (withdrawn). The polymersome of claim 52 further comprising at least one lipid, phospholipid, steroid, cholesterol, single chain alcohol, peptide, or surfactant.

88 (previously presented). The polymersome of claim 52 wherein the amphiphilic copolymer is made by attaching two strands comprising different monomers.

89 (previously presented). The polymersome of claim 52 wherein the amphiphilic copolymer comprises polymers made by free radical initiation, anionic polymerization, peptide synthesis, or ribosomal synthesis using transfer RNA.

90 (previously presented). The polymersome of claim 52 wherein the hydrophilic polymer comprises poly(ethylene oxide) or poly(ethylene glycol).

91 (previously presented). The polymersome of claim 52 wherein the hydrophilic polymer is soluble in water.

92 (previously presented). The polymersome of claim 52 wherein the hydrophilic polymer comprises polymerized units selected from ionically polymerizable polar monomers.

93 (original). The polymersome of claim 92 wherein the ionically polymerizable polar monomers comprise an alkyl oxide monomer.

94 (original). The polymersome of claim 93 wherein the alkyl oxide monomer is ethylene oxide, propylene oxide, or any combination thereof.

95 (original). The polymersome of claim 90 wherein the hydrophilic polymer comprises poly(ethylene oxide).

96 (original). The polymersome of claim 95 wherein the volume fraction of the hydrophilic polymers in the plurality of amphiphilic block copolymers is less than or equal to 0.40.

97 (previously presented). The polymersome of claim 52 wherein the hydrophobic polymer comprises polyethylethylene, poly(butadiene), poly(β -benzyl-L-aspartate), poly(lactic acid), poly(propylene oxide), poly(ϵ -caprolactam), oligo-methacrylate, or polystyrene.

98 (original). The polymersome of claim 97 wherein the hydrophobic polymer comprises polyethylethylene or poly(butadiene).

99 (original). The polymersome of claim 97 wherein the hydrophobic polymer comprises polymerized units selected from ethylenically unsaturated monomers.

100 (original). The polymersome of claim 98 wherein the ethylenically unsaturated monomers are hydrocarbons.

101 (previously presented). The polymersome of claim 52 wherein the amphiphilic block copolymer is poly(ethylene oxide)-polyethylethylene, poly(ethylene oxide)-poly(butadiene), poly(ethylene oxide)-poly(ϵ -caprolactone) or poly(ethylene oxide)-poly(lactic acid).

102 (withdrawn). The polymersome of claim 52 additionally comprising a therapeutic agent.

103 (withdrawn). The polymersome of claim 52 additionally comprising one or more distinct emissive species.

104 (withdrawn). The polymersome of claim 52 additionally comprising at least one of a secondary emitter, a cytotoxic agent, a magnetic resonance imaging (MRI) agent, positron emission tomography (PET) agent, radiological imaging agent or a photodynamic therapy (PDT) agent.

105 (withdrawn). The polymersome of claim 52 additionally comprising at least one of a secondary emitter, a cytotoxic agent, a magnetic resonance imaging (MRI) agent, positron emission tomography (PET) agent, photodynamic therapy (PDT) agent, radiological imaging agent, ferromagnetic agent, or ferrimagnetic agent, where said emitter or agent is compartmentalized within the aqueous polymersome interior.

106 (withdrawn). The polymersome of claim 52 additionally comprising a protein, peptide, saccharide, nucleoside, inorganic compound, biological entity such as a virus, organelle, bacterium, or cellular component, or organic compound compartmentalized within the aqueous polymersome interior.

107 (withdrawn). A method of delivering an agent to a biological situs in a tissue or organism comprising administering to the tissue or organism a polymersome having the agent and comprising (a) a membrane comprising a plurality of amphiphilic copolymers comprising amphiphilic block copolymers that comprise at least one hydrophilic polymer bonded to at least one hydrophobic polymer; (b) at least one emissive agent which emits light at a wavelength between 700-1100 nm where said emissive agent is an emissive conjugated compound comprising at least two covalently bound moieties; whereby upon exposing said compound to an energy source for a time and under conditions effective to cause said compound to emit light that at a wavelength between 700-1100 nm, said compound exhibits

an integral emission oscillator strength that is greater than the emission oscillator strength manifest by either one of the said moieties individually; and (c) at least one targeting moiety associated with a surface of the polymersome.

108 (canceled).

109 (withdrawn). The method of claim 107 wherein the emissive agent is an porphinato imaging agent.

110 (withdrawn). The method of claim 107 further comprising determining when a selected amount of the polymersome is at the situs; and liberating at least a portion of the agent.

111 (withdrawn). The method of claim 109 wherein said porphinato imaging agent is an ethynyl- or butadiynyl-bridged multi(porphyrin) compound that features a β -to- β , meso-to- β , or meso-to-meso linkage topology, and the porphinato imaging agent being capable of emitting in the 700-to-1100 nm spectral regime.

112 (withdrawn). The method of claim 109 wherein said emissive agent comprises at least two porphyrin moieties, said porphyrin moieties being linked by a hydrocarbon bridge comprising at least one unsaturated moiety.

113 (withdrawn). The method of claim 107 where at least one emissive agents comprises a porphycene, rubyrin, rosarin, hexaphyrin, sapphyrin, chlorophyl, chlorin, phthalocynine, porphyrazine, bacteriochlorophyl, pheophytin, texaphyrin macrocyclic-based component, or a metalated derivative thereof.

114 (withdrawn). The method of claim 107 where at least one emissive agent is a laser dye, fluorophore, lumophore, or phosphor.

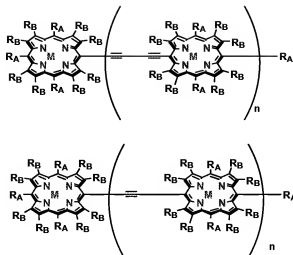
115 (withdrawn). The method of claim 114 where at least one emissive agent is a laser dye that is sulforhodamine B, Rhodamine 101, cresyl violet perchlorate, DODC iodide, sulforhodamine 101, oxazine 4 perchlorate, DCM oxazine 170 perchlorate, nile blue A perchlorate, oxazine 1 perchlorate, pyridine 1, styryl 7, H1DC iodide, cryptocyanine, DOTC iodide, H1TC iodide, H1TC perchlorate, DTTC perchlorate, IR-144, HD1TC perchlorate, IR-NO, IR-132, IR-125; rhodamine b, where said laser dye is modified by addition of a hydrophobic substituent, said laser dye being substantially within the polymersome membrane.

116 (withdrawn). The method of claim 107 where at least one emissive agent is a near infrared (NIR) emissive species that is a di- and tricarbocyanine dye, croconium dye, thienylenephenylenevinylene species substituted with at least one electron withdrawing substituent, where said emissive species is modified by addition of a hydrophobic substituent, said laser dye being substantially within the polymersome membrane.

117 (withdrawn). The method of claim 107 where at least one of the emissive agent is an emissive conjugated compound comprising at least two covalently bound moieties; whereby upon exposing said compound to an energy source for a time and under conditions effective to cause said compound to emit light at a wavelength between 700-1100 nm, is of an intensity that is greater than a sum of light emitted by either of covalently bound moieties individually.

118 (canceled).

119 (withdrawn). The method of claim 107 wherein the emissive agent is of the formula:



where M is a metal or H₂, where H₂ denotes the free ligand form of the macrocycle;

R_A and R_B are each, independently, H, alkyl or C₁-C₂₀ heteroalkyl, C₆-C₂₀ aryl or heteroaryl, C(R_C)=C(R_D)(R_E), C≡C(R_D), or a chemical functional group comprising a peptide, nucleoside or saccharide where R_C, R_D and R_E are each independently, H, F, Cl, Br, I, C₁-C₂₀ alkyl or C₄-C₂₀ heteroalkyl, aryl or heteroaryl, C₂-C₂₀ alkenyl or heteroalkenyl, alkynyl or C₂-C₂₀ heteroalkynyl, trialkylsilyl, or porphyrinato;

and n is an integer from 1 to 10.

120 (withdrawn). The method of claim 111 wherein the targeting moiety comprises an antibody, antibody fragment, or substance specific for a given receptor binding site.

121 (withdrawn). The method of claim 120 wherein the receptor binding site, or substance, comprises a receptor-specific peptide, carbohydrate, protein, lipid, nucleoside, peptide nucleic acid, or combinations thereof.

122 (withdrawn). The method of claim 111 wherein the hydrophilic polymer comprises poly(ethylene oxide) or poly(ethylene glycol).

123 (withdrawn). The method of claim 122 wherein the hydrophilic polymer comprises poly(ethylene oxide).

124 (withdrawn). The method of claim 123 wherein the volume fraction of hydrophilic polymers in the plurality of amphiphilic block copolymers is less than or equal to 0.40.

125 (withdrawn). The method of claim 122 wherein the hydrophobic polymer comprises polyethylethylene, poly(1,2-butadiene), poly(β -benzyl-L-aspartate), poly(lactic acid), poly(propylene oxide), poly(ϵ -caprolactam), oligo-methacrylate, or polystyrene.

126 (withdrawn). The method of claim 125 wherein the hydrophobic polymer comprises polyethylethylene or poly(1,2-butadiene).

127 (withdrawn). The method of claim 107 wherein the amphiphilic block copolymer comprises poly(ethylene oxide)-polyethylethylene, poly(ethylene oxide)-poly(butadiene), poly(ethylene oxide)-poly(ϵ -caprolactone) or poly(ethylene oxide)-poly(lactic acid).

128 (withdrawn). The method of claim 110 wherein the therapeutic agent is liberated using ultrasonic energy to disrupt the structure of the polymersome.

129 (withdrawn). The method of claim 110 wherein the therapeutic agent is liberated using light energy to disrupt the structure of the polymersome.

130 (withdrawn). The method of claim 110 wherein the therapeutic agent is liberated using enzymatic degradation of polymeric components of the polymersome.

131 (withdrawn). A method of ascertaining the presence or absence of a disease state in an organism or tissue comprising:

administering a polymersome to a patient, the polymersome comprising (a) a membrane comprising a plurality of amphiphilic copolymers comprising amphiphilic block copolymers that comprise at least one hydrophilic polymer bonded to at least one

hydrophobic polymer; (b) at least one emissive agent that emits light at a wavelength between 700-1100 nm where said emissive agent is an emissive conjugated compound comprising at least two covalently bound moieties; whereby upon exposing said compound to an energy source for a time and under conditions effective to cause said compound to emit light that at a wavelength between 700-1100 nm, said compound exhibits an integral emission oscillator strength that is greater than the emission oscillator strength manifest by either one of the said moieties individually; and (c) at least one targeting moiety associated with a surface of the polymersome;

providing an instrument optically coupled to a light source, a light detector, or both,
and

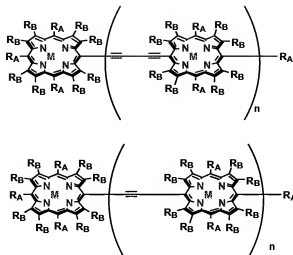
operating the instrument to monitor the amount or distribution of the porphinato imaging agent within the organism or tissue.

132 (canceled).

133 (withdrawn). The method of claim 131 wherein the emissive agent is an porphinato imaging agent.

134 (withdrawn). The method of claim 133 wherein the porphinato imaging agent is an ethynyl- or butadiynyl-bridged multi(porphyrin) compound that features a β -to- β , meso-to- β , or meso-to-meso linkage topology, and the porphinato imaging agent being capable of emitting in the 700-to-1100 nm spectral regime.

135 (withdrawn). The method of claim 134 wherein the porphinato imaging agent is of the formula:



where M is a metal or H₂, where H₂ denotes the free ligand form of the macrocycle;

R_A and R_B are each, independently, H, alkyl or C₁-C₂₀ heteroalkyl, C₆-C₂₀ aryl or heteroaryl, C(R_C)=C(R_D)(R_E), C≡C(R_D), or a chemical functional group comprising a peptide, nucleoside or saccharide where R_C, R_D and R_E are each independently, H, F, Cl, Br, I, C₁-C₂₀ alkyl or C₄-C₂₀ heteroalkyl, aryl or heteroaryl, C₂-C₂₀ alkenyl or heteroalkenyl, alkynyl or C₂-C₂₀ heteroalkynyl, trialkylsilyl, or porphyrinato;

and n is an integer from 1 to 10.

136 (withdrawn). The method of claim 134 wherein said emissive agent comprises at least two porphyrin moieties, said porphyrin moieties being linked by a hydrocarbon bridge comprising at least one unsaturated moiety.

137 (withdrawn). The method of claim 131 where at least one emissive agent comprises a porphycene, rubyrin, rosarin, hexaphyrin, sapphyrin, chlorophyll, chlorin, phthalocynine, porphyrazine, bacteriochlorophyll, pheophytin, texaphyrin macrocyclic-based component, or a metalated derivative thereof.

138 (withdrawn). The method of claim 131 where at least one emissive agent is a laser dye, fluorophore, lumophore, or phosphor.

139 (withdrawn). The method of claim 138 where at least one emissive agent is a laser dye that is sulforhodamine B, Rhodamine 101, cresyl violet perchlorate, DODC iodide, sulforhodamine 101, oxazine 4 perchlorate, DCM oxazine 170 perchlorate, nile blue A perchlorate, oxazine 1 perchlorate, pyridine 1, styryl 7, HIDC iodide, cryptocyanine, DOTC iodide, HITC iodide, HITC perchlorate, DTTC perchlorate, IR-144, HDITC perchlorate, IR-NO, IR-132, IR-125; rhodamine b, where said laser dye is modified by addition of a hydrophobic substituent, said laser dye being substantially within the polymersome membrane.

140 (withdrawn). The method of claim 131 where at least one emissive agent is a near infrared (NIR) emissive species that is a di- and tricarbocyanine dye, croconium dye, thienylenephenylenevinylene species substituted with at least one electron withdrawing substituent, where said emissive species is modified by addition of a hydrophobic substituent, said laser dye being substantially within the polymersome membrane.

141 (withdrawn). The method of claim 131 where at least one of the emissive agent is an emissive conjugated compound comprising at least two covalently bound moieties; whereby upon exposing said compound to an energy source for a time and under conditions effective to cause said compound to emit light at a wavelength between 700-1100 nm, is of an intensity that is greater than a sum of light emitted by either of covalently bound moieties individually.

142 (canceled).

143 (withdrawn). The method of claim 131 wherein the targeting moiety comprises an antibody, antibody fragment, or substance specific for a given receptor binding site.

144 (withdrawn). The method of claim 143 wherein the receptor binding site or substance comprises a receptor-specific peptide, carbohydrate, protein, lipid, nucleoside, peptide nucleic acid, or combinations thereof.

145 (withdrawn). The method of claim 134 wherein the hydrophilic polymer comprises poly(ethylene oxide) or poly(ethylene glycol).

146 (withdrawn). The method of claim 143 wherein the hydrophilic polymer comprises poly(ethylene oxide).

147 (withdrawn). The method of claim 146 wherein the volume fraction of hydrophilic polymers in the plurality of amphiphilic block copolymers is less than or equal to 0.40.

148 (withdrawn). The method of claim 145 wherein the hydrophobic polymer comprises polyethylethylene, poly(1,2-butadiene), poly(β -benzyl-L-aspartate), poly(lactic acid), poly(propylene oxide), poly(ϵ -caprolactam), oligo-methacrylate, or polystyrene.

149 (withdrawn). The method of claim 148 wherein the hydrophobic polymer comprises polyethylethylene or poly(1,2-butadiene).

150 (withdrawn). The method of claim 131 wherein the amphiphilic block copolymer is poly(ethylene oxide)-polyethylethylene, poly(ethylene oxide)-poly(butadiene), poly(ethylene oxide)-poly(ϵ -caprolactone) or poly(ethylene oxide)-poly(lactic acid).

151 (withdrawn). The method of claim 131 additionally comprising at least one of a secondary emitter, a cytotoxic agent, a magnetic resonance imaging (MRI) agent, positron emission tomography (PET) agent, radiological imaging agent, radiological imaging agent or a photodynamic therapy (PDT) agent.

152 (withdrawn). The method of claim 133 additionally comprising at least one of a secondary emitter, a cytotoxic agent, a magnetic resonance imaging (MRI) agent, positron emission tomography (PET) agent, radiological imaging agent or a photodynamic therapy (PDT) agent, where said emitter or agent is compartmentalized within the aqueous polymersome interior.

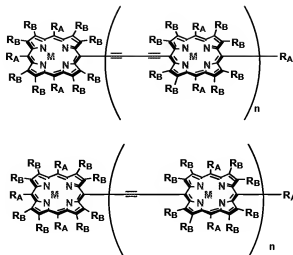
153 (withdrawn). An *in vivo* method of diagnostics or imaging comprising:
contacting a polymersome with tissue within an organism, the polymersome comprising (a) a membrane comprising a plurality of amphiphilic copolymers comprising amphiphilic block copolymers that comprise at least one hydrophilic polymer bonded to at least one hydrophobic polymer; (b) at least one emissive agent that emits light at a wavelength between 700-1100 nm where said emissive agent is an emissive conjugated compound comprising at least two covalently bound moieties; whereby upon exposing said compound to an energy source for a time and under conditions effective to cause said compound to emit light that at a wavelength between 700-1100 nm, said compound exhibits an integral emission oscillator strength that is greater than the emission oscillator strength manifest by either one of the said moieties individually; and (c) at least one targeting moiety associated with a surface of the polymersome;
providing an instrument optically coupled to a light source, a light detector, or both, and
using the instrument to monitor the amount of the polymersome at a situs within the tissue.

154 (canceled).

155 (withdrawn). The method of claim 153 wherein the emissive agent is an porphinato imaging agent.

156 (withdrawn). The method of claim 155 wherein the said imaging agent is an ethynyl- or butadiynyl-bridged multi(porphyrin) compound that features a β -to- β , meso-to- β , or meso-to-meso linkage topology, and the porphinato imaging agent being capable of emitting in the 700-to-1100 nm spectral regime.

157 (withdrawn). The method of claim 156 wherein the porphinato imaging agent is of the formula:



where M is a metal or H₂, where H₂ denotes the free ligand form of the macrocycle;

R_A and R_B are each, independently, H, alkyl or C₁-C₂₀ heteroalkyl, C₆-C₂₀ aryl or heteroaryl, C(R_C)=C(R_D)(R_E), C≡C(R_D), or a chemical functional group comprising a peptide, nucleoside or saccharide where R_C, R_D and R_E are each independently, H, F, Cl, Br, I, C₁-C₂₀ alkyl or C₄-C₂₀ heteroalkyl, aryl or heteroaryl, C₂-C₂₀ alkenyl or heteroalkenyl, alkynyl or C₂-C₂₀ heteroalkynyl, trialkylsilyl, or porphyrinato;

and n is an integer from 1 to 10.

158 (withdrawn). The method of claim 155 wherein the targeting moiety comprises an antibody, antibody fragment, or substance specific for a given receptor binding site.

159 (withdrawn). The method of claim 158 wherein the receptor binding site or substance comprises a receptor-specific peptide, carbohydrate, protein, lipid, nucleoside, peptide nucleic acid, or combinations thereof.

160 (withdrawn). The method of claim 156 wherein the hydrophilic polymer comprises poly(ethylene oxide) or poly(ethylene glycol).

161 (withdrawn). The method of claim 160 wherein the hydrophilic polymer comprises poly(ethylene oxide).

162 (withdrawn). The method of claim 161 wherein the volume fraction of hydrophilic polymers in the plurality of amphiphilic block copolymers is less than or equal to 0.40.

163 (withdrawn). The method of claim 160 wherein the hydrophobic polymer comprises polyethylene, poly(1,2-butadiene), poly(β -benzyl-L-aspartate), poly(lactic acid), poly(propylene oxide), poly(ϵ -caprolactam), oligo-methacrylate, or polystyrene.

164 (withdrawn). The method of claim 163 wherein the hydrophobic polymer comprises polyethylene or poly(1,2-butadiene).

165 (withdrawn). The method of claim 155 wherein the amphiphilic block copolymer is poly(ethylene oxide)-polyethylene, poly(ethylene oxide)-poly(butadiene), poly(ethylene oxide)-poly(ϵ -caprolactone) or poly(ethylene oxide)-poly(lactic acid).

166 (withdrawn). An *in vitro* diagnostic method comprising:
contacting a polymersome with isolated cells, mixtures of cells, or specific cell lines, with the polymersome comprising (a) a membrane comprising a plurality of amphiphilic copolymers comprising amphiphilic block copolymers that comprise at least one hydrophilic polymer bonded to at least one hydrophobic polymer; (b) at least one emissive agent that is dispersed within the polymersome membrane, at least one that emits light at a wavelength between 700-1100 nm where said emissive agent is an emissive conjugated compound comprising at least two covalently bound moieties; whereby upon exposing said compound to an energy source for a time and under conditions effective to cause said compound to emit light that at a wavelength between 700-1100 nm, said compound exhibits an integral emission oscillator strength that is greater than the emission oscillator strength manifest by either one of the said moieties individually; and (c) at least one targeting moiety associated with a surface of the polymersome;

providing an instrument optically coupled to a light source, a light detector, or both,
and
using the instrument to monitor cell-surface-to-polymersome binding.

167 (canceled).

168 (withdrawn). The method of claim 166 wherein the targeting moiety targets cancer cells allowing the method to be utilized for real-time cancer detection.

169 (withdrawn). The method of claim 166 wherein more than one emissive agent is used, each emissive agent having a different emissive signature, and further comprising the step of creating a panoply of unique histological markers for multiple distinct biomarkers for in vitro diagnosis.

170 (withdrawn). A method for histological labeling, molecular classification of cell surface markers, or guiding the development of novel directed therapeutic strategies, comprising
contacting a polymersome with isolated cells, mixtures of cells, or specific cell lines, with the polymersome comprising (a) a membrane comprising a plurality of amphiphilic copolymers comprising amphiphilic block copolymers that comprise at least one hydrophilic polymer bonded to at least one hydrophobic polymer; (b) at least one emissive agent that is dispersed within the polymersome membrane, at least one that emits light at a wavelength between 700-1100 nm where said emissive agent is an emissive conjugated compound comprising at least two covalently bound moieties; whereby upon exposing said compound to an energy source for a time and under conditions effective to cause said compound to emit light that at a wavelength between 700-1100 nm, said compound exhibits an integral emission oscillator strength that is greater than the emission oscillator strength manifest by either one of the said moieties individually; and (c) at least one targeting moiety associated with a surface of the polymersome;

providing an instrument optically coupled to a light source, a light detector, or both,
and

using the instrument to monitor cell-surface-to-polymersome binding.

171 (canceled).

172 (withdrawn). A method of modulating the emission properties of a visible- or near infrared-emissive agent comprising at least two covalently bound moieties, said emissive agent being within a polymeric material, wherein at least one of the bound moieties comprises an ancillary substituent, the size and chemical constitution of said substituent being selected to provide said modulation.

173 (withdrawn). The method of claim 172 wherein said modulation is of the steady state emission wavelength.

174 (withdrawn). The method of claim 172 wherein said modulation is of the time-dependent emission dynamics of said emissive conjugated compound.

175 (withdrawn). The method of claim 172, wherein the said emissive agent is a multi(porphyrin) imaging agent comprises a meso-to-meso ethyne- or butadiyne-bridged linkage topology, said imaging agent being capable of emitting in the 700-to-1100 nm spectral regime.

176 (withdrawn). The method of claim 172 wherein the said emissive agent comprises a porphycene, rubyrin, rosarin, hexaphyrin, sapphyrin, chlorophyl, chlorin, phthalocynine, porphyrzine, bacteriochlorophyl, pheophytin, texaphyrin macrocyclic-based component, or a metalated derivative thereof.

177 (withdrawn). The method of claim 172 wherein the said emissive agent comprises a laser dye, fluorophore, lumophore, or phosphor.

178 (withdrawn). The method of claim 172 wherein the said emissive agent comprises at least two covalently bound moieties; whereby upon exposing said agent to an energy source

for a time and under conditions effective to cause said compound to emit light at a wavelength between 700-1100 nm, is of an intensity that is greater than a sum of light emitted by either of covalently bound moieties individually.

179 (withdrawn). The method of claim 172 wherein the said emissive agent comprises at least two covalently bound moieties; whereby upon exposing said compound to an energy source for a time and under conditions effective to cause said compound to emit light that at a wavelength between 700-1100 nm, and exhibits an integral emission oscillator strength that is greater than the emission oscillator strength manifest by either one of the said moieties individually.

180 (withdrawn). The method of claim 172 wherein the covalently bound moieties that define the emissive species are linked by ethynyl, ethenyl, allenyl, butadiynyl, polyvinyl, thiophenyl, furanyl, pyrrolyl, or p-diethylarenyl linkers or by a conjugated heterocycle that bears diethynyl, di(polyynynyl), divinyl, di(polyvinyl), or di(thiophenyl) substituents.

181 (withdrawn). The method of claim 172 wherein the polymeric material is a plurality of amphiphilic copolymers.

182 (withdrawn). The method of claim 172 wherein the ancillary substituent on at least one of bound moieties comprising the emissive conjugated compound is alkyl, alkoxy, aryl, or ether.

183 (withdrawn). The method of claim 172 wherein the ancillary substituent on at least one of bound moieties comprising the emissive conjugated compound is independently C₁-C₂₀ alkyl, C₁-C₂₀ alkoxy, -O-(CH₂)_mCO₂R', -O(CH₂)-(O(CH₂))_xR or -O-(CH₂)_pCROH, where m and p are independently an integer from 1 to 10, x is an integer from 1 to 12, and R' is C₁-C₂₀ alkyl or C₅-C₂₀ aryl.

184 (withdrawn). The method of claim 172 wherein the ancillary substituent on at least one of bound moieties comprising the emissive conjugated compound is aryl or substituted aryl.